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A New Fish of the Genus *Gambusia* from Southern Veracruz, Mexico, with a Discussion of the Tribe Gambusiini Hubbs.

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(Text-figures 1-8).

On a New York Zoological Society expedition in March of 1948, Myron Gordon, James W. Atz and F. G. Wood, Jr., made extensive collections of the freshwater fishes of the Atlantic slope of southern Mexico. Among these is a new poeciliid belonging to the genus *Gambusia* Poey of the tribe Gambusiini Hubbs. A diagnostic description follows.

***Gambusia atzi*, new species.**

*Type specimens.* The holotype, deposited at the University of Michigan Museum of Zoology, cat. no. 167098, is an adult male 23.50 mm. in standard length, collected by James W. Atz and F. G. Wood, Jr., on March 5, 1948. Together with the holotype, 46 paratypes were obtained (UMMZ 167099) which range in size from 20.50 to 23.50 mm. for the adult males, and from 22.25 to 31.00 mm. for the adult females. Among the paratypes, 10 males, 19 females and 17 immature forms were collected. All 10 male paratypes are fully mature and each has a perfectly formed gonopodium.

*Type locality.* "Laguna de la Sapote," about one kilometer northwest of Jesus Carranza, Veracruz (Text-fig. 1). The waters of the Laguna are continuous with the Río Jaltepec which is part of the Coatzacoalcos drainage system. Fishes were found along the shore waters in coarse grass. The bottom of the Laguna consisted of mud overlying clay.

Additional specimens were collected in the Arroyo Santiago Vasques, which also drains into the Río Jaltepec at Jesus Carranza. The water of this stream was partially opaque and its banks were overhung with a thick jungle flora. Specimens were also seined from a stream running into the Arroyo Santa Lucrecia, about 700 meters from its confluence with the Río Jaltepec at Jesus Carranza. As before, jungle growth overhung the stream-bed and the bottom was clay with some gravel.

*Diagnosis.* On the basis of gonopodial and other details, this species is definitely a member of the tribe Gambusiini Hubbs. Of the two genera in this tribe, *Belonesox* Kner and *Gambusia* Poey, it clearly enters the latter.

It resembles the other members of the genus *Gambusia* in having a distinctly fusiform body with the dorsal fin placed far posteriorly on the body. Like other gambusiini, it has a typically long and slender gonopodium originating somewhat behind the level of the base of the pectoral fin. This species differs from other members of the genus principally as follows: it is more fusiform; the trailing edge of its dorsal fin almost reaches the base of its caudal (Text-fig. 2); many of its gonopodial details deviate significantly. For example, the claws on rays 4p and 5a of the gonopodium are much reduced, and the elbow on ray 4a is large, with a strong retrorse curve. In addition, the pronounced buckling of the subdistal elements of rays 4a and 4p constitutes a positive means of distinguishing *G. atzi* from the other members of the genus (see Description, below).

*Description.* In the gonopodium (Text-fig. 3), the primary and secondary claws (at the tips of rays 4p and 5a) are small, almost rudimentary: in this respect they are similar to the claws in the gonopodium of *Belonesox belizanus* Kner (Text-fig. 4). A series of 7 to 8 high and irregularly rectangular segments follow the claw on ray 5a. The segments of ray 5p, which constitute the lateral margins of the spoon, are serrate along their free edges and generally have two denticles each. The subterminal segments immediately proximal to the primary claw of ray 4p, usually 5 in number, are long and thin, especially distally; the 4 segments between them and the proximal serrae are without definite form, but resemble irregular discs. There are 6 to 8 proximal serrae, the last members usually having a common base. The tip of ray 4a originates proximal to the primary claw, at the level of the first subterminal segment of ray 4p; it extends proximally as a uniform series of 5 slender elements which are associated with another series of discoidal segments, 4 or 5 in number. These latter elements are followed by three stout rectangular segments which join the elbow. The irregular, discoidal segments of this ray form an open-S together with their distal and proximal serial homologs, producing a curious buckle in the ray. The buckling of ray 4a is a constant feature of all the gono-

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TEXT-FIG. 1. Type locality of *Gambusia atzi*. The small dot near the Río Coatzacoalcos represents Jesus Carranza (Santa Lucrecia), Veracruz, Mexico.

podia examined. The elbow on the same ray is quite large, larger than in any other gambusiin species. It is the largest single structure in the gonopodium of this species, and its anterior projection has a strong retrorse curve. Rays 4a and 4p are completely fused just behind the level of the elbow.

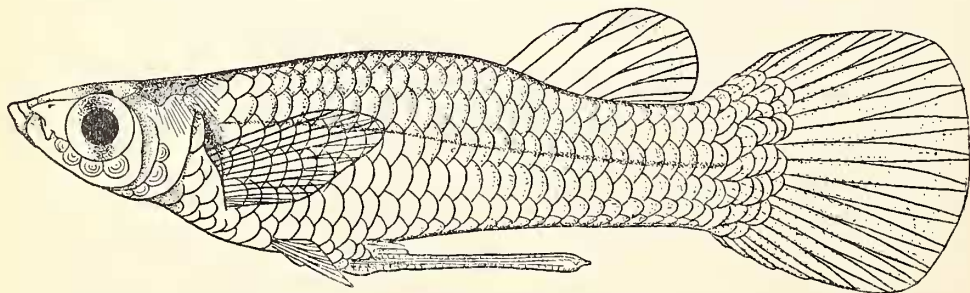
The tip of ray 3 is reduced, originating behind the tip of ray 4a. The terminal segment is long and slender, followed by a series of 11 to 13 short spines. The shafts of the distal spines curve proximally, but the major extension is an anterior one. In general, ray 3 curves sharply posteriorly at its tip. The terminal segment of ray 3 lies close to and occasionally overlaps the distal segments of ray 4a. The pronounced subdistal curvature of the tip of ray 3 and the staggered distribution of the tips of rays 4p, 4a and 3 produce a concavity on the anterior margin of the tip of the gonopodium (Text-fig. 3).

Number of scales along mid-lateral line: 26 to 29, most often 28. Number of scale rows along side, at the level of the anus (level of greatest depth):  $6\frac{1}{2}$  to 7. Dorsal fin rays, counting the last 2 rays as one:

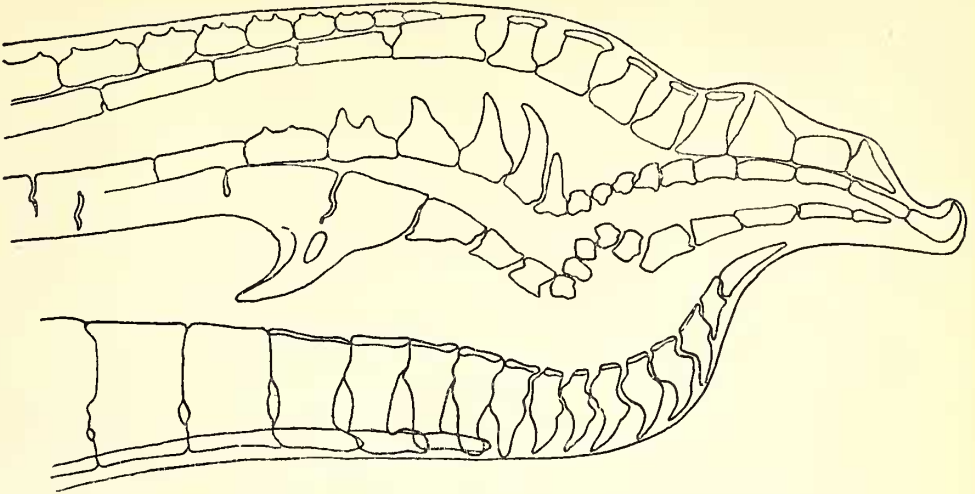
6, rarely 7. Pelvic fins of both sexes short, 7 times into the standard length. Depth about 4 times into standard length. The premaxillary in both sexes is broad and flat. Lower jaw projecting up obliquely at a sharp angle. Gape of mouth wide.

The coloration of *G. atzi* is quite constant, differing slightly but significantly from the coloration of other members of the tribe. It is yellowish-brown in alcohol. A thin but well-defined lateral streak extends from the base of the hypural to the base of the pectoral fin. Edges of scale pockets finely dotted with melanophores; they produce a faint dusky and variegated appearance. There is no other regular or irregular spotting on sides. One of the striking features of the coloration of this new species is as follows: A dark line runs along the entire dorsal margin and ends anteriorly in a heavily pigmented area above the supraoccipital. There is a dark line on the ventral margin of the caudal peduncle, which ends abruptly at the base of the gonopodium. All fins are faintly stippled with melanophores.

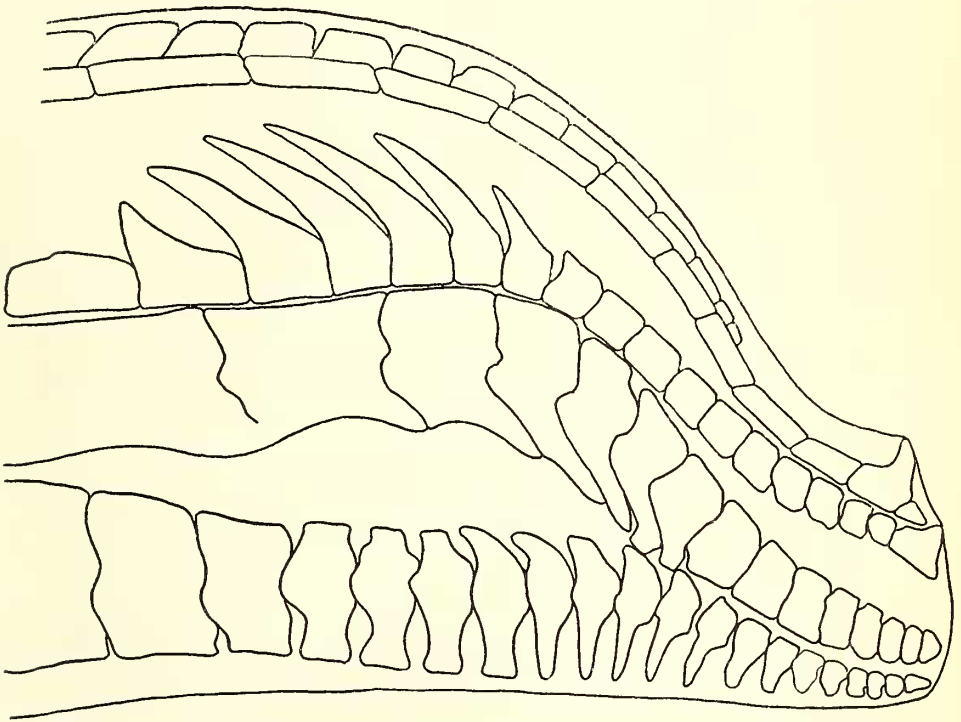
*Relationships.* The members of the tribe



TEXT-FIG. 2. Diagnostic drawing of a male of *Gambusia atzi* ( $\times 6$ ).



TEXT-FIG. 3. Distal tip of the gonopodium of *Gambusia atzi* ( $\times 50$ ).



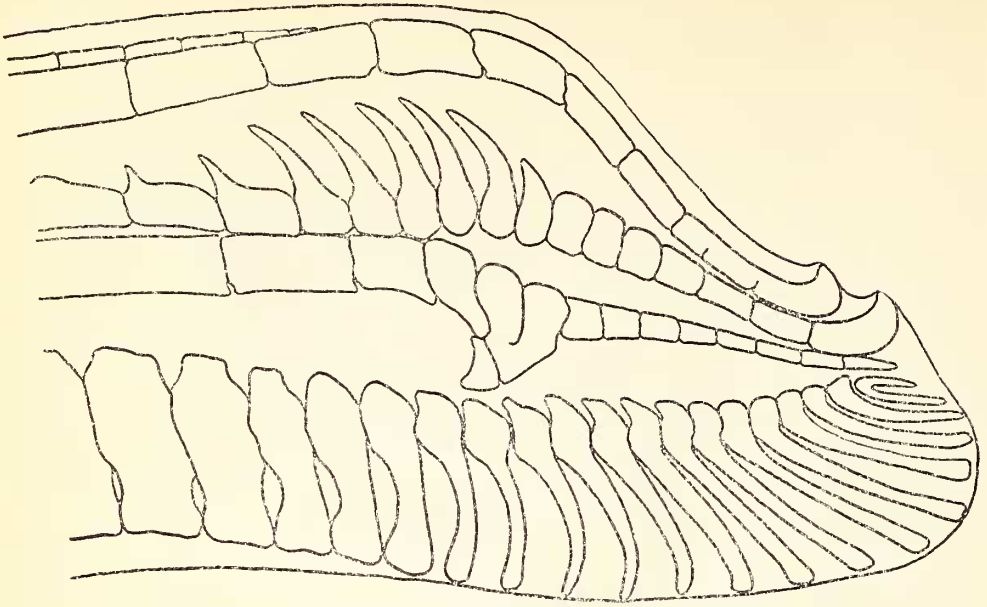
TEXT-FIG. 4. Distal tip of the gonopodium of *Belonesox belizanus* ( $\times 40$ ).

Gambusiini are among the most ubiquitous of all poeciliid fishes. They are found throughout the eastern, central and southwestern United States, Mexico and Central America, the Lesser and Greater Antilles and the Bahamas. Beyond this extensive range, a species, *Gambusia lemaitrei* Fowler (1950), has recently been described from Colombia. But despite their great range, they constitute a remarkably uniform group of fishes, the only notable exception being *Belonesox belizanus* Kner. Nevertheless, many species and subspecies have been recognized by some work-

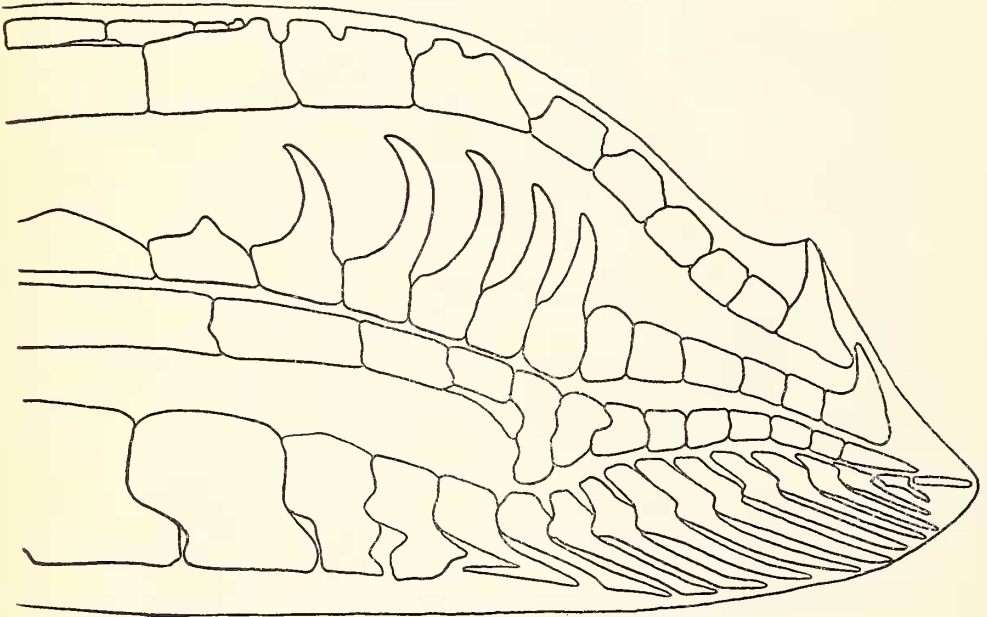
ers. The precise nature of the relationships among the various members of the group remains in doubt.

Hubbs (1926) placed *Belonesox* Kner and *Gambusia* Poey in the tribe Gambusiini Hubbs. He subdivided *Gambusia* into four subgenera largely on the basis of distinctions in gonopodial morphology. These subgenera are:

*Heterophallina*.  
*Gambusia*.  
*Arthropallus*.  
*Schizophallus*.



TEXT-FIG. 5. Distal tip of the gonopodium of *Gambusia panuco* ( $\times 50$ ).

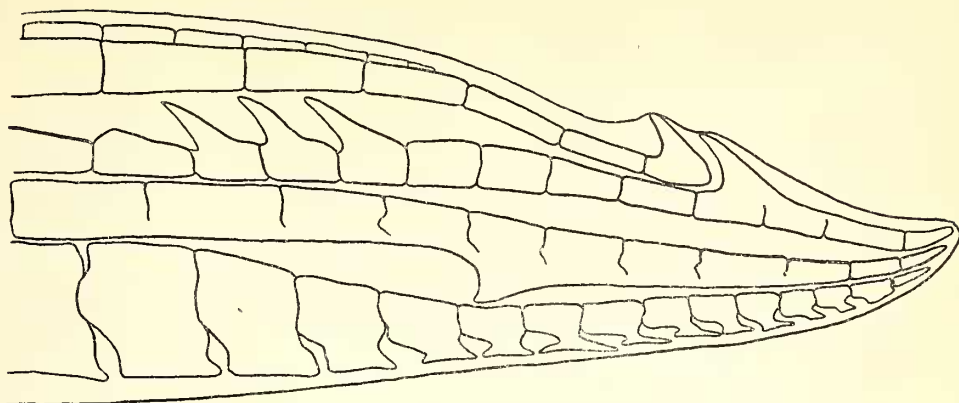


TEXT-FIG. 6. Distal tip of the gonopodium of *Gambusia nicaraguensis* ( $\times 50$ ).

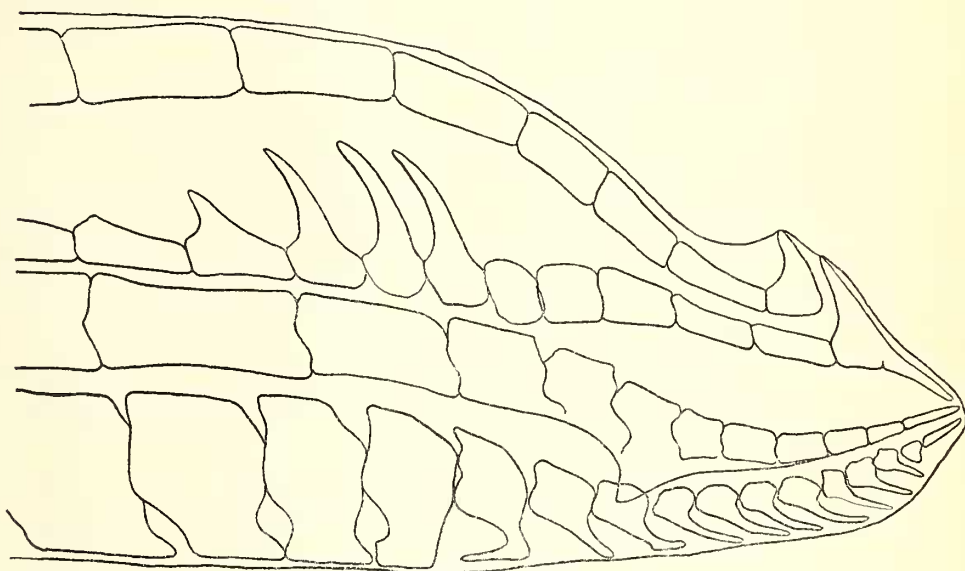
The subgenus *Heterophallina* includes three species, *G. regani* Hubbs, *G. vittata* Hubbs and *G. panuco* Hubbs. The last has been studied intensively by Rosen (unpublished), who notes that the gonopodium of *G. panuco* may be distinguished from those of other gambusiins by the presence of reduced and curvilinear claws and long, slender, finger-like spines (Text-fig. 5).

Hubbs listed twelve species in the subgenus *Gambusia* which, among others, in-

clude *G. affinis* Baird & Girard, and *G. nicaraguensis* Günther. With reference to a host of diagnostic characters, particularly those in the gonopodia, these two species are quite different. *G. nicaraguensis* is a stout fish, heavily marked with characteristic melanophore spotting, especially on the dorsal and caudal fins. Its gonopodium contains short, high claws and long, slender antrorse spines (Text-fig. 6). *G. affinis* is a far more slender fish with significantly less regular spotting.



TEXT-FIG. 7. Distal tip of the gonopodium of *Gambusia affinis* ( $\times 50$ ).



TEXT-FIG. 8. Distal tip of the gonopodium of *Gambusia dominicensis* ( $\times 50$ ).

Its gonopodium contains shorter claws and severely reduced and specialized spines (Text-fig. 7). Krumholz (1948) pointed out that the nominal species *G. affinis*, included in the subgenus *Gambusia* by Hubbs (1926), should actually be referred to *G. senilis* Girard, described by Regan (1913) and Geiser (1923). The true *G. affinis* is quite distinct, while the morphological details of *G. senilis* are closely similar to those of *G. nicaraguensis*. An additional species *G. dominicensis* Regan, also included in the subgenus *Gambusia*, is similar to the true *G. affinis* in many of its morphological details (Text-fig. 8).

The remaining two subgenera, *Arthropallus* Hubbs and *Schizophallus* Hubbs, include species which have generally been regarded as belonging to the "*G. affinis* complex." They are *G. patruelis* Baird & Girard (*Arthropallus*) and *G. holbrooki* Girard (*Schizophallus*). Geiser (1923) sug-

gested that the form discussed as *G. patruelis* by Regan (1913) is so close to *G. affinis* in many of its structural details that it should be dropped into synonymy with the latter. This point of view has been shared by other workers. Geiser also indicated that the eastern representative of the *G. affinis* group should be treated as a distinct species, *G. holbrooki*, implying, however, that it is quite close to *G. affinis* and not deserving of more than specific rank. The subgenus *Schizophallus* containing the species *G. holbrooki* was based apparently upon an anomalous specimen or specimens by Hubbs (1926). More recently the subgenus *Schizophallus* has been abandoned by Hubbs and *G. holbrooki* is generally recognized today as being very closely allied to *G. affinis*. Krumholz (1948), in his review of some of the literature, states that Hubbs & Walker (unpublished) recognize only a single species, *G. affinis*, for which three subspecies may be

named: *G. a. affinis*, *G. a. holbrooki* and *G. a. speciosa*. That the gambusiini found in the United States, with the exception of *G. senilis*, are closely related and probably only subspecifically different is confirmed by Haskins & Rosen (unpublished). They show, together with Geiser (1923) and Hubbs & Walker (unpublished), that the fishes of the eastern-most fringe of the range of *Gambusia* intergrade with those of the central and southwestern United States.

Within the Gambusiini there are five basic gonopodial types which are represented by "species groups". These groups have definite ranges for the most part:

1. The *G. affinis* type occupies the eastern, central and southwestern United States.
2. The *G. panuco* type is largely restricted to northern Mexico.
3. *G. nicaraguensis* and related forms are found in Mexico, Central America, the Antilles and the Bahaman Islands.
4. *Belonesox belizanus*, in general, shares the mainland distribution of the *G. nicaraguensis* complex.
5. *G. atzi* is localized at the southern tip of Veracruz. It occurs sympatrically with *G. nicaraguensis* and *Belonesox belizanus*.

This new species is quite distinct from other known Gambusiini with reference to its gonopodial details. Its particular complex of genitalic elements does not fit within the framework of the subgeneric characters as indicated by Hubbs (1926) or into any other specific group of systematic characters now known. The discovery of this new species emphasizes the need for a revision of the entire Gambusiini.

This species is named for James W. Atz, Assistant Curator, New York Aquarium,

New York Zoological Society, in recognition of his energetic work in collecting this and many other species of Mexican fishes.

#### ACKNOWLEDGMENTS.

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